REMARKS

By the foregoing amendments, claims 1, 7, and 12 have been amended and claims 6 and 11 have been canceled. Currently, claims 1-5, 7-10, 12, and 13 are pending. The amendments do not include new subject matter. For example, the amendments to claim 1 contains claim language from previous claim 6. Thus, Applicants note that support for the amended claims can be found throughout the specification.

Formal Matters

Applicants note with appreciation that the Action has acknowledged the claim of priority under 35 U.S.C. § 119(a)-(d).

Applicants also thank the Examiner for consideration of the documents submitted to the PTO in the Information Disclosure Statements of July 26, 2006, September 21, 2006, July 18, 2007, and January 15, 2008 by returning electronically signed and initialed copies of the forms PTO-1449.

Claim Rejections under 35 U.S.C. § 112, second paragraph

The Action rejects claims 1, 6, 9, and 11 under 35 U.S.C. § 112, second paragraph, as allegedly indefinite. The Action suggests that there should be clarification with respect to the block polymers and the random copolymers.

By the foregoing amendments to the claims, Applicants respectfully submit that the rejection has been addressed. Applicants respectfully request withdrawal of the rejection.

Claim Rejections under 35 U.S.C. § 102

The Office raises the following anticipation rejections:

a.) The Action rejects claims 1-5, 7-11, and 12-13 under 35 U.S.C. § 102(b) as allegedly being anticipated by Doki et al. (U.S. Patent Application Publication No. 2002/0115790).

b.) The Action rejects claims 6 and 11 under 35 U.S.C. § 102(b) as allegedly being anticipated by Doki et al. with evidentiary support from Kuraray, Co. product specification website.

In view of the cancellation of claims 6 and 11, Applicants respectfully request the above rejection b).

As for rejection a), Applicants respectfully note that Doki et al. employs a thermoplastic elastomer with a main dispersion peak temperature in a tan δ curve obtained by the measurement of viscoelasticity between -30 °C and +50 °C (see Doki et al., [0028]). Doki et al. presents as specific examples of the thermoplastic elastomer, HYBRAR-5127 (styrene-isoprene-styrene block polymer), HYBRAR-7125 (styrene-hydrogenated isoprene-styrene block polymer), and Tuftec H1041 (styrene-ethylenebutylene-styrene block copolymer).

The present invention requires a thermoplastic elastomer containing a block composed of a hydrogenated aromatic vinyl compound that is randomly copolymerized with a diene compound. Neither HYBRAR-5127 nor HYBRAR-7125 nor Tuftec H1041 contains randomly

copolymerized elastomers. In evidence of this statement, Applicants submit a catalog excerpt of "HYBRAR" obtained from Kuraray Co., Ltd. The catalog illustrates that HYBRAR-5127 consists of "hard blocks" (polystyrene blocks) and "soft blocks" (vinyl-bond rich polydiene). Each of the two blocks are not random blocks. Thus, the catalog indicates that HYBRAR-5127 does not contain a random block as required by the present invention.

Applicants further submit that the elastomers containing random blocks as in the present invention do not only result in high vibration damping ability and excellent frictional wear properties but also oil resistance to the polyoxymethylene resin. Applicants further note that *Comparative* Examples 2, 3, 4, 5, 7, and 8 of the present application use HYBRAR-5127 as a elastomer. The *Comparative* Examples show that resins containing HYBRAR-5127 do not have the desired oil resistance.

By the foregoing amendments to the claims, Applicants respectfully submit that the rejections have been addressed. Applicants respectfully request withdrawal of the rejection.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants submit that all of the claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue. Favorable consideration with early allowance of all of the pending claims is most earnestly requested.

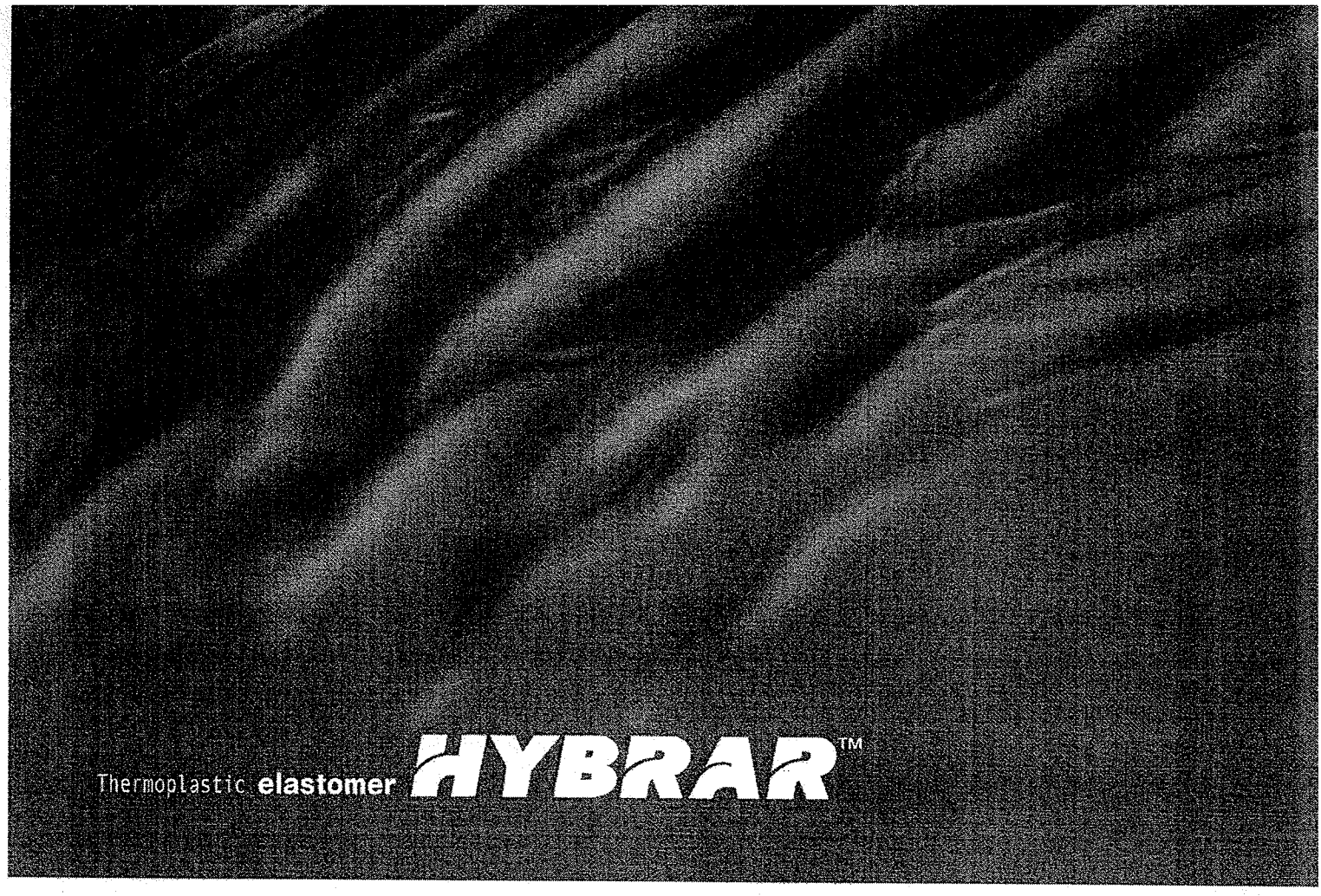
Should the Examiner have any questions, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,
Mitsuhiro HORIO et al.

Bruce H. Bernstein
Reg. No. 29,027 42,920

September 8, 2008
GREENBLUM & BERNSTEIN, P.L.C.
1950 Roland Clarke Place
Reston, VA 20191
(703) 716-1191

Enclosures: "Thermoplastic elastomer HYBRAR," catalog obtained from Kuraray Co., Ltd



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kuraray

What is HYBRAR™ ?

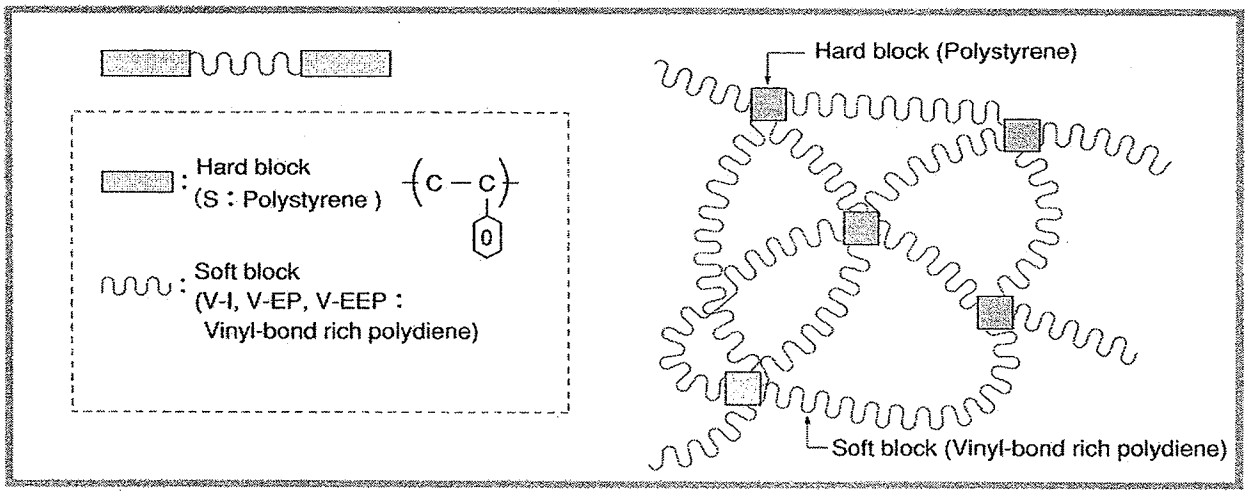
HYBRAR™ is a styrenic block copolymer having a vinyl-polydiene soft block developed by Kuraray Co., Ltd. using its unique isoprene technology.

HYBRAR™ is a series of thermoplastic rubbers which offer high vibration damping properties due to its glass transition temperature (Tg) near room temperature. This opens HYBRAR™ for use in damping applications that are not favorable with Kuraray's SEPTON™ product series.

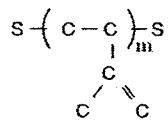
Hydrogenated HYBRAR™ grades, the 7000 series, exhibit excellent miscibility with polypropylene. As a result, hydrogenated HYBRAR™ /PP blends have excellent transparency. Unlike flexible PVC, they offer good flexibility and mechanical properties without the need for plasticizers while being friendlier to the environment. HYBRAR™ can be processed in various shapes including film, sheet and tube.

Similarly to many rubbers, HYBRAR™ can be vulcanized. Cured HYBRAR™ foams exhibit low compression sets and good elasticity.

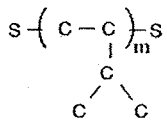
Molecular Structure Model



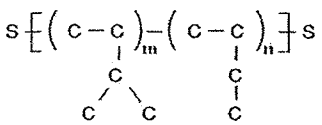
Vinyl-bond rich SIS (5127, 5125)



Vinyl-bond rich SEPS (7125)

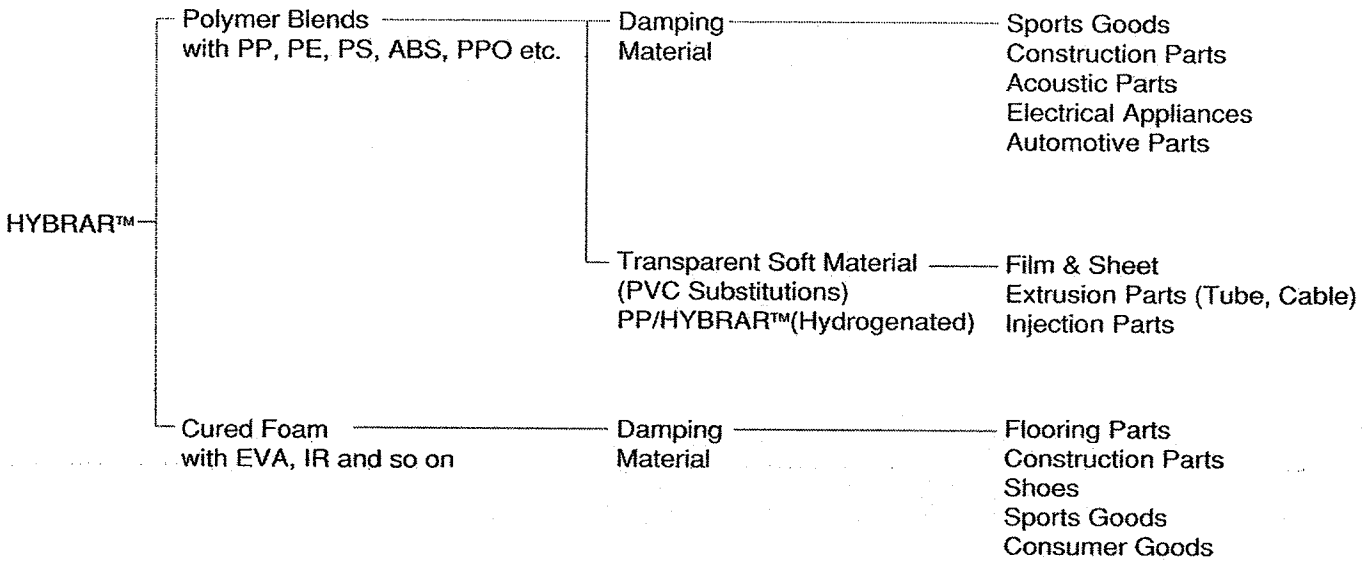


Vinyl-bond rich SEEPS (7311)



I : Polyisoprene
EP : Hydrogenated Polyisoprene
EEP : Hydrogenated Poly(isoprene/butadiene)

Application Examples of HYBRAR™



HYBRAR™ Grades

Tested by KURARAY CO., LTD.

	Grade	Type	Styrene Content (wt%)	Peak Temp. of Tanδ (℃)	Glass Transition Temp. (℃)	Specific Gravity	Hardness (Type A)	Tensile Property 100% Modulus (MPa)	Tensile Property 300% Modulus (MPa)	Tensile Property Tensile Strength (MPa)	Tensile Property Elongation (%)	MFR 190℃, 2.16kg (g/10min)	MFR 230℃, 2.16kg (g/10min)	Solution Viscosity 15wt% (mPa·s)	Solution Viscosity 20wt% (mPa·s)	Solution Viscosity 30wt% (mPa·s)	Physical Form
Unhydrogenated Grades	5127	Vinyl-bond rich SIS	20	20	8	0.94	84	2.8	4.7	12.4	730	5	—	—	—	540	Pellet
Unhydrogenated Grades	5125	Vinyl-bond rich SIS	20	-3	-13	0.94	60	1.6	2.5	8.8	730	4	—	—	100	650	Pellet
Hydrogenated Grades	7125	Vinyl-bond rich SEPS	20	-5	-15	0.90	64	1.7	2.7	7.1	680	0.7	4	—	55	350	Pellet
Hydrogenated Grades	7311	Vinyl-bond rich SEEPS	12	-17	-32	0.89	41	0.6	0.9	6.3	1050	0.5	2	90	240	—	Pellet
Measurement Method			—	—	DSC (Temp. increase by 10℃/min.)	ISO 1183	ISO 7619	ISO 37				ISO 1133		Toluene solution 30℃			—

Unit Conversion : 1MPa=10.20 kgf/cm² 1mPa・s=1cPs

1) Precautions should be taken in handling and storing. Refer to the appropriate Material Safety Data Sheet for further safety information.
2) In using HYBRAR™, please confirm related law and regulations, and examine its safety and suitability for the application.
3) For Medical, Healthcare and Food Contact applications, please contact your SEPTON™ representative for specific recommendations. HYBRAR™ should not be used in any devices or materials intended for implantation in the human body.

※ The figures, graphs, and charts in this booklet are representative ones measured by KURARAY, and those are without guarantee because each conditions of use are beyond Kuraray's control.

Characteristics

Both(Unhydrogenated,Hydrogenated)

High vibration damping at room temperature

High affinity to polyolefins and styrenics

Can be formed

Curable like vulcanized rubbers

Rubber like elasticity

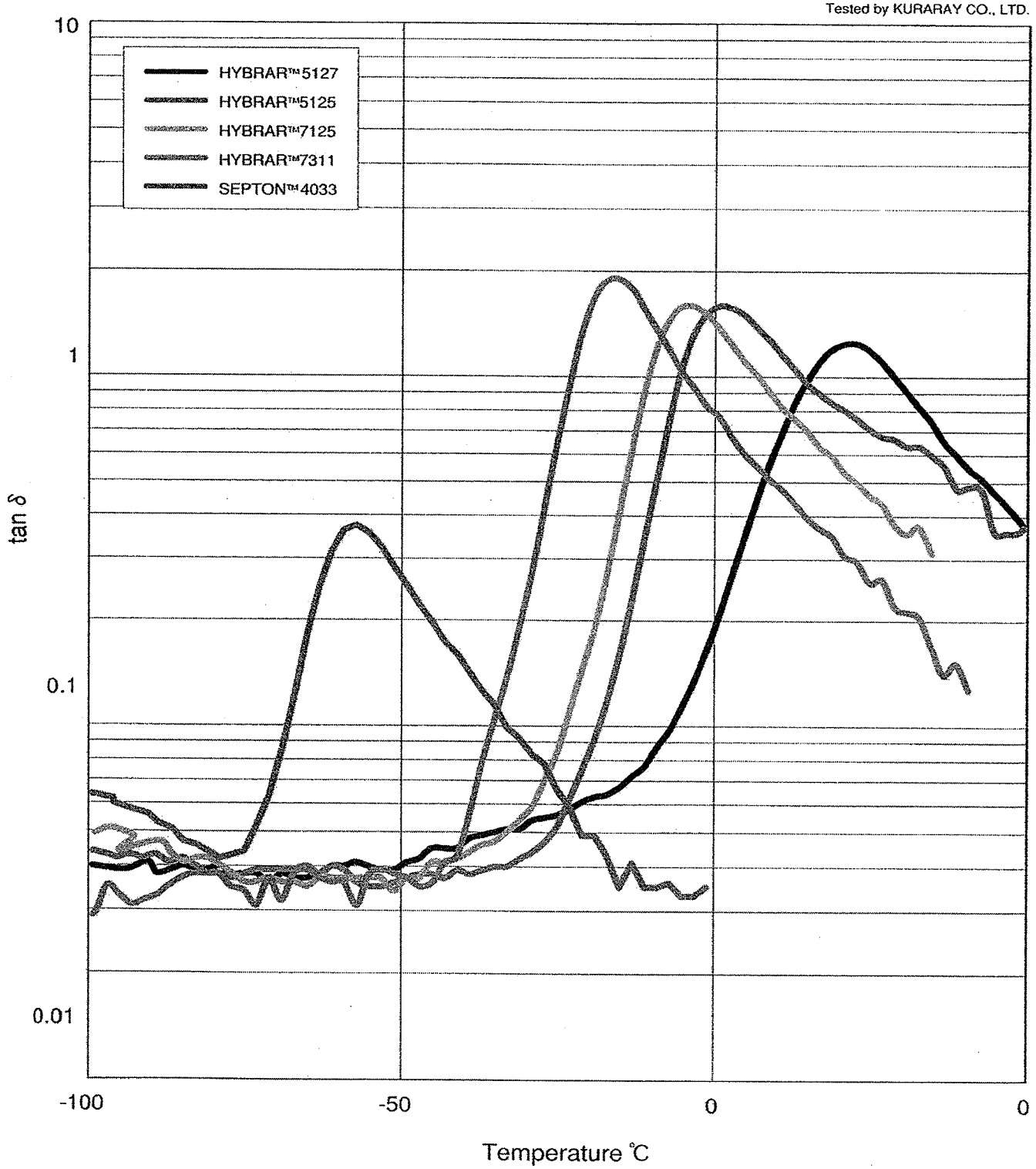
Hydrogenated

Excellent miscibility with polypropylene

Excellent heat and weather resistance

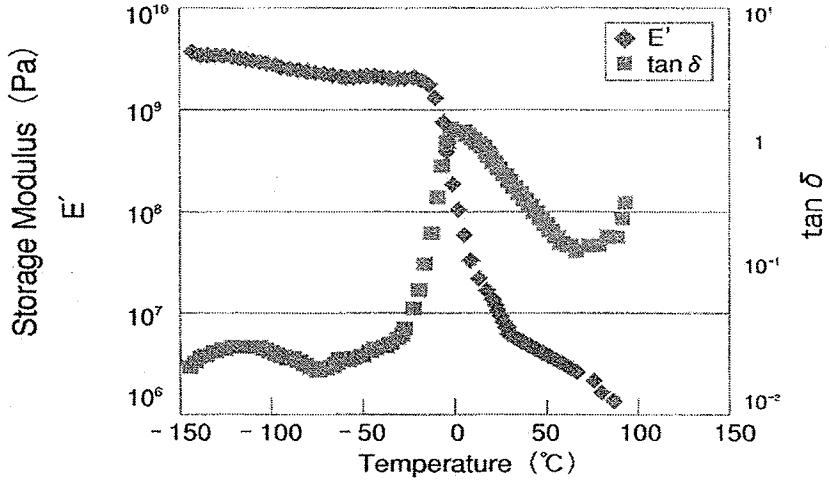
Temperature Dependence of Tan δ

Tested by KURARAY CO., LTD.



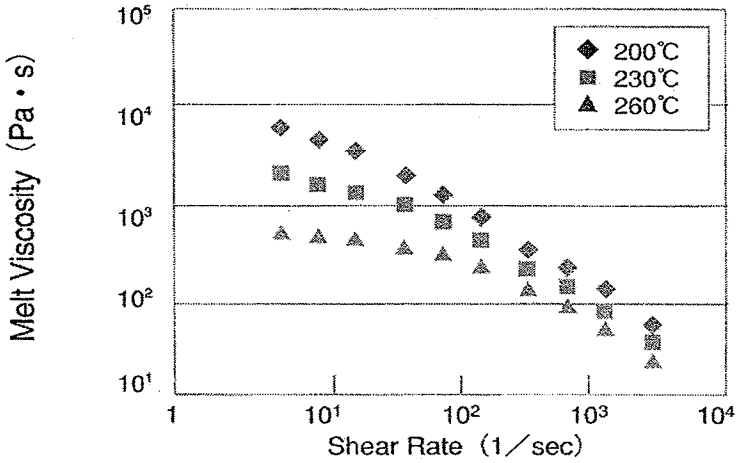
HYBRAR™ Properties Tested by KURARAY CO., LTD.

Dynamic Viscoelastic Behavior



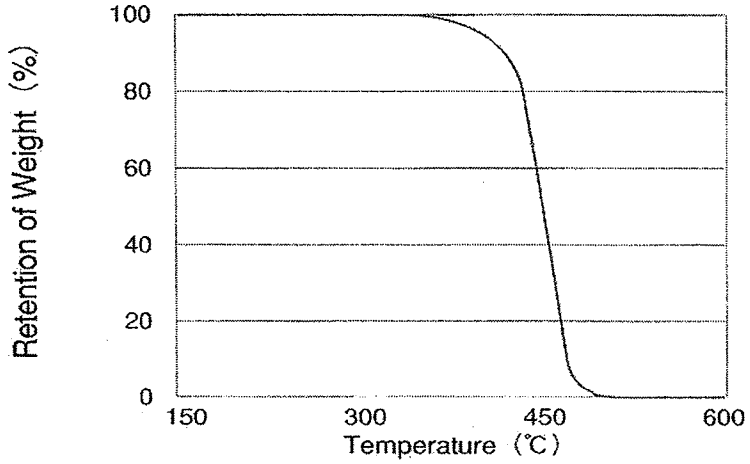
Test Conditions :
HYBRAR™ 7125
Dynamic Rheometer "REOVIBRON DDV-III" Tensile mode
Heating Rate 3℃/min.
Frequency 11Hz

Capillary Flow Test



Test Conditions :
HYBRAR™ 7125
Capillary Rheometer "CAPIRO GRAPH"

Heat Resistance



Test Conditions :
HYBRAR™ 7125
Thermo-balance Heat Degradation
Heating Rate 10℃/min.
Nitrogen Atmosphere

Electrical Properties

Item		
Specific Inductive Capacity	10^3 Hz	1.5
	10^4 Hz	1.5
	10^5 Hz	1.5
	10^6 Hz	1.5
Dielectric Loss Tangent	10^3 Hz	—
	10^4 Hz	0.0015
	10^5 Hz	0.0011
	10^6 Hz	0.0012
Dielectric Breakdown Strength	kV/mm	36.9
Volume Resistivity	Ω・cm	2.0×10^{17}

Test Conditions :
HYBRAR™ 7125
Specific Inductive Capacity : Electrode indirect method (Vacancy mode)
Dielectric Breakdown Strength : JIS K-6911 Voltage Rising Rate 2kV/sec
Volume Resistivity : Measured 1min. after applying DC 500V (at 20℃)

Combustion Test

Combustion Gas		Amount Formed	Detection Limit
SOx(reduced to SO_2)	(mg/g)	not detected	0.1
NOx(reduced to NO_2)	(mg/g)	not detected	0.5
HCl	(mg/g)	not detected	0.1
HCN	(mg/g)	not detected	0.05
NH_3	(mg/g)	not detected	0.1
CO	(mg/g)	140	10
CO_2	(mg/g)	350	10
Gross Calorific Value	(J/g)	45000	

Test Conditions:
HYBRAR™ 7125
Combustion gas JIS K-7217 (Combustion condition A)
Gross Calorific Value JIS M8814 Calorimeter

Solubility Data

Soluble	Partially Soluble	Insoluble
Petroleum Benzine	Ethyl Acetate	Methanol
Toluene	Methyl Ethyl Ketone	Ethanol
Hexane		Acetone
Cyclohexane		Water
Chloroform		Dimethyl Formamide
Carbon Tetrachloride		
Carbon Disulfide		
Tetrahydrofuran		

Test Conditions :
HYBRAR™ 7125
Put 10wt% of polymer into each solvent and vibrate for two days at the room temperature.
The solubility is judged by the appearance.

HYBRAR™ Applications ~Polymer Blends~

(1) Plastic/HYBRAR™ Blend

HYBRAR™ can be blended with various plastics to produce materials which exhibit excellent vibration damping properties. Some blends using HYBRAR™ 5127 and their physical properties are depicted below:

Polystyrene/HYBRAR™ Blend

Tested by KURARAY CO.,LTD.

(wt %)		1	2	3	4
Formulation					
Polystyrene		100	90	85	80
HYBRAR™5127			10	15	20
Physical Properties					
Evaluation of Damping Properties					
Tan δ Loss Factor	(0℃)	0.033	0.044	0.047	0.049
	(25℃)	0.035	0.051	0.075	0.115
	(40℃)	0.037	0.045	0.063	0.094
Loss Factor (Degree of Damping)		0.016	0.023	0.040	0.068
Mechanical Properties					
Hardness	(Type-D)	83	80	76	74
Tensile Modulus	(MPa)	2600	2300	2200	1900
Tensile Strength	(MPa)	49	51	47	43
Elongation	(%)	13	18	21	17
Flexural Modulus	(MPa)	2600	2300	2100	1700
Flexural Strength	(MPa)	74	34	28	23

Conditions

Blended with Twin Screw Extruder at 200℃

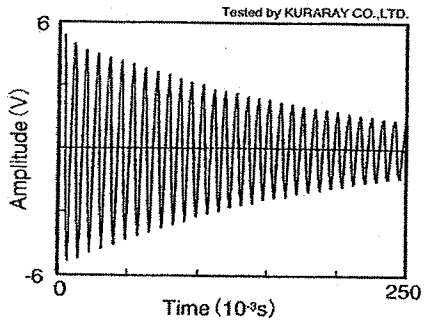
Test samples molded with Injection Molder. (Cylinder at 200℃, Mold at 60℃)

Evaluation of Damping Properties:Tanδ measured with Rheovibron (Dynamic Viscoelastometer, Orientec) at 110Hz

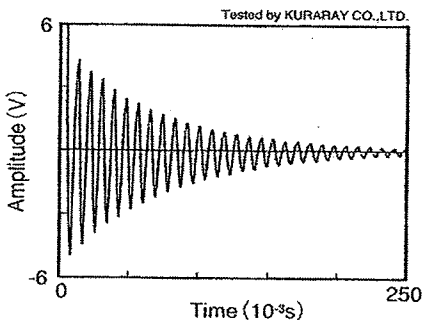
Loss Factor(Degree of Damping) measured by resonance method with a cantilever beam

The vibration damping behavior of the PS/5127 blend, when struck by a steel ball, is shown below.

PS=100



PS /5127=85/15



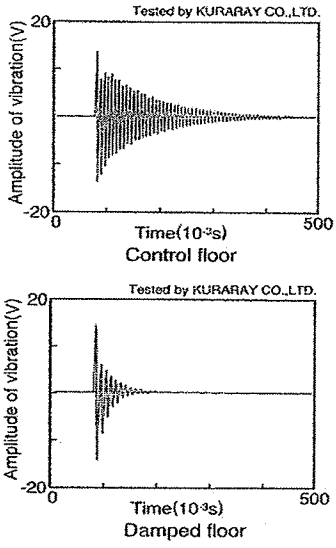
(2) HYBRAR™ based filler compounds

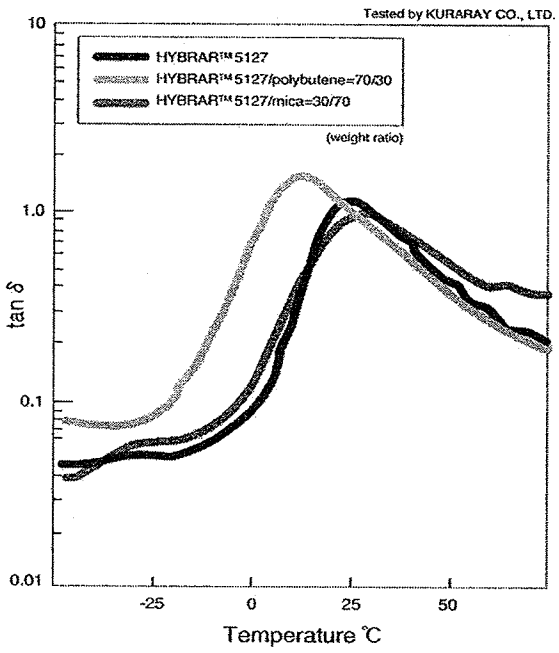
Damping compounds can be produced from the combination of HYBRAR™ and inorganic fillers such as mica, graphite, calcium carbonate,etc.

Tested by KURARAY CO.,LTD.

(parts by weight)		
Formulation		
HYBRAR™5127		70
Polybutene		30
EVA		20
Mica		150
Light Calcium Carbonate		150
Calcium Stearate		4
Carbon Black(GPF)		4
Damping Properties(Reovibron:11Hz)		
Tan δ at 0℃		0.54
25℃		0.73
40℃		0.51
Mechanical Properties		
Tensile Strength	MPa	3.6
Elongation	%	90
Hardness	Shore A	89
Specific Gravity	——	1.83

(1MPa≒10.20kgf/cm²)





Application to a Wooden Floor
Test Specimen:Control Floor-Two Layer Plywood(Thickness=2.4mm&5.3mm)
Damped Floor-Three Layer Plywood/Damping Compound/ Plywood
2.4mm / 0.5mm / 5.3mm
Test Method:Damped Oscillation Curve was measured by the resonance method with a cantilever beam at 26℃

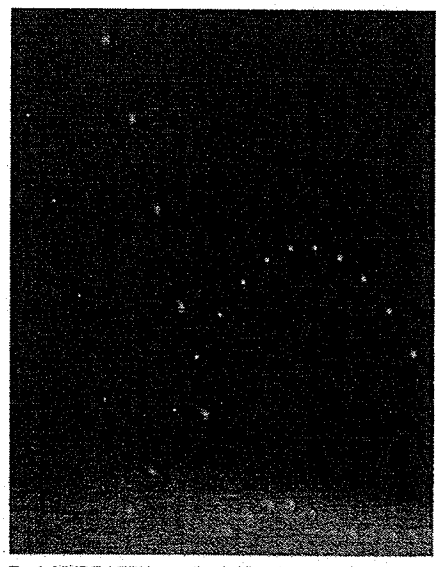
(3) SEPTON™ and HYBRAR™ combination compound

HYBRAR™ can be blended with olefins and/or SEPTON™ to produce soft compounds which exhibit excellent vibration damping properties. Some compounds using HYBRAR™ 5127 and their physical properties are depicted below:

Tested by KURARAY CO.,LTD.

(parts by weight)		1	2	3
Formulation				
SEPTON™ 4055		100	100	100
HYBRAR™ 5127			100	100
Process Oil		180	100	60
Polypropylene		50	40	40
Physical Properties				
Resilience	(%)	40	17	12
Hardness	(Type A)	48	51	61
Tensile Modulus	(MPa)	0.8	1	1.4
Tensile Strength	(MPa)	9.3	10.3	13.9
Elongation	(%)	990	850	800
Compression Set				
25℃×22h	(%)		15	17
70℃×22h	(%)	41		59
MFR (230℃, 21N)	(g/10min)	5	17	6

Mixing Condition: Twin Screw Extruder at 210℃
Molding Condition: Injection Molding (Cylinder at 210℃, Mold at 50℃)
Resilience: ISO 4662 Lupke Type Rebound Resilience Tester
=Hr/Ho x100 (Hr: Rebound Height, Ho: Fall Height)



Red: HYBRAR™ based compound
Blue: Common rubber based compound

HYBRAR™ Applications

~PP / HYBRAR™ (Hydrogenated) Blends~

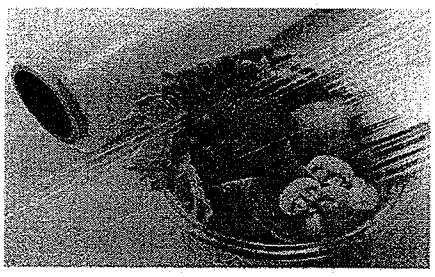
Hydrogenated HYBRAR™ grades (HYBRAR™ 7125 and HYBRAR™ 7311) exhibit excellent miscibility with polypropylene. Unlike flexible PVC, they offer good flexibility and mechanical properties without the need for plasticizers while being friendlier to the environment.

HYBRAR™ 7311 has a lower styrene content and a lower glass transition temperature than HYBRAR™ 7125. As a result, PP/7311 blends are more flexible at room temperature than PP/7125 blends and offer better impact properties at lower temperatures.

PP/7125, PP/7311 Blends

Tested by KURARAY CO.,LTD.

(parts by weight)		1	2	3	4	5	6	7
Formulation								
Polypropylene (Random)		100	90	80	70	90	80	70
HYBRAR™7125			10	20	30			
HYBRAR™7311						10	20	30
Physical Properties								
Hardness	(Type A)	98	98	96	98	94	96	94
	(Type D)	63	55	46	42	54	44	35
Young's Modulus	(MPa)	490	480	250	140	380	140	90
Tensile Strength	(MPa)	37	35	30	30	34	30	28
Elongation	(%)	1400	1400	1400	1600	1400	1600	1700
Impact strength								
Notched Izod at-20℃	(J/m)	30	32	36	38	45	320	860
Haze (1mm thick film)	(%)	52	49	30	19	52	33	27



Mono Layer (Cast Film)

Tested by KURARAY CO.,LTD.

(wt%)		1		2		3		4	
Formulation									
Polypropylene (Random)		90		85		80		70	
HYBRAR™7125		10		15		20		30	
Mechanical Properties		MD	TD	MD	TD	MD	TD	MD	TD
Tensile Strength	(MPa)	38	35	35	38	37	36	38	30
Young's Modulus	(MPa)	240	230	200	220	140	150	110	100
Elongation	(%)	1090	1130	1000	1200	1270	1170	1150	1090
Optical Properties									
Haze	(%)	3.9		2.8		0.9		0.4	

(Thickness=50 μm)

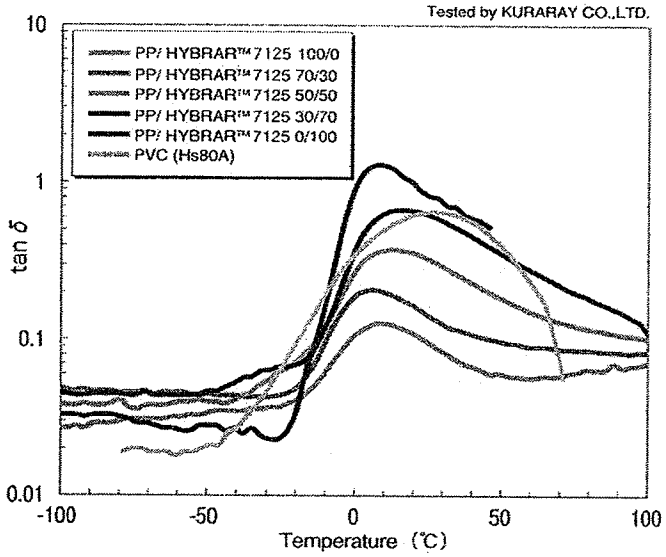
Comparison of PP/ HYBRAR™ (Hydrogenated) blends and Flexible PVC

	PP / HYBRAR™ (Hydrogenated) Blend	Soft PVC
Halogen Free	○	×
Plasticizer Free	○	×
Low Specific Gravity	○	×
Transparency	○	○
Flexibility	○	○
Heat Resistance	○	○
Weather Resistance	○	○

(○Good ×Not Good)

Dynamic Viscoelastic Behavior for PP / HYBRAR™ 7125

Tested by KURARAY CO.,LTD.



In case of PP/HYBRAR™ 7125=30/70 formulation (——), it shows very similar dynamic viscoelastic behavior to Soft PVC shown as above, and so it has very similar feeling to Soft PVC (——) such as unique slow-recovery property.

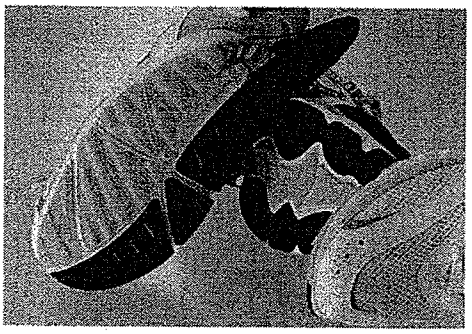
HYBRAR™ Applications ~Cured Foam~

Damping foams can be made with HYBRAR™ by using foaming and curing agents. An example is shown below.

Comparison data between conventional EVA foam and HYBRAR™ based foam

Tested by KURARAY CO.,LTD.

(parts by weight)	1	2
Formulation		
EVA (VA Content : 19wt%)	100	50
HYBRAR™5127		50
Curing Agent	0.8	0.175
Foaming Agent	3	3
ZnO	2	2
Stearic Acid	1	1
TiO2	4	4
Physical Properties		
Specific Gravity	0.17	0.18
Hardness (ASTM D2240, TypeC, 14℃)	65	66
Compression Set (%)	65	48
Resilience (%)	40	19
Tensile Strength (MPa)	2.1	2.1
Elongation (%)	230	230



Mixing Condition: Kneader and Roll-mill at 100℃～130℃

Curing Condition: Press Molding at 145℃ for 60min. with 14.7 MPa pressure

KURARAY CO., LTD.
:Ote Center Bildg., 1-1-3 Otemachi, Chiyoda-Ku, Tokyo 100-8115
PHONE: +81-3-6701-1601, FACSIMILE: +81-3-6701-1645

KURARAY AMERICA, INC.
:11414 Choate Road, Pasadena, TX 77507
PHONE: +1-281-909-5850, FACSIMILE: +1-281-909-5851

KURARAY EUROPE GMBH
:Building F821, Hoechst Industrial Park, 65926 Frankfurt am Main
PHONE: +49-69-305-35850, FACSIMILE: +49-69-305-35650

http://www.septon.info/en
http://www.kuraray.co.jp/en